Patent Claims

1. Short-coherence interferometer for measuring partial distances of the eye which focuses the measurement beam on the respective coherence window and/or reduces the required interferometer mirror scan distances to distances that are less than the distances which must be measured, characterized in that at least one deflecting element (e.g., mirror, prism) with a deflecting angle α (316, 749) and elements of focusing optics (319, 709) in the short-coherence interferometer carry out a periodic back-and-forth movement (double-arrow 560) in such a way that the measurement beam focus (101', 322, 712) which is generated by the focusing optics and imaged on the eye by relay optics (103, 321, 711) is moved synchronous with the coherence window from the cornea along the optic axis of the eye to the retina (e.g., fovea centralis), and back.

2. Short-coherence interferometer for measuring partial distances of the eye according to claim 1, characterized in that at least one deflecting element during its movement directs the measurement beam or reference beam preferably sequentially to a series of reflectors arranged in a staggered manner with respect to depth and/or laterally.

3. Short-coherence interferometer for measuring partial distances of the eye according to claim 2, characterized in that the position of the reflectors which are arranged in a staggered manner with respect to depth and laterally is adjustable and/or the positioning is carried out in an adaptive manner according to previously determined reference positions of the eye interfaces.

4. Short-coherence interferometer for measuring partial distances of the eye according to one of claims 1 to 3, characterized in that at least one deflecting element (316, 749) and the focusing optics (319, 709, 709') are arranged one behind the other and/or next to one another in the movement direction on a table of a scanning device that is moved periodically back and forth.

5. Short-coherence interferometer for measuring partial distances of the eye according to one of claims 1 to 3, characterized in that at least one deflecting element (316, 749) and the focusing optics (319, 709, 709') are arranged one behind the other and/or next to one another at a desired angle to the movement direction on the table of a scanning device that is moved periodically back and forth.

6. Short-coherence interferometer for measuring partial distances of the eye according to one of the preceding claims, characterized in that the measurement beam focus (101, 320, 710, 710') generated by the focusing optics (319, 709, 709') is imaged on the eye by relay optics (321, 711), wherein the corneal vertex is arranged exactly or approximately at distance $b = f\left(1 + \frac{f}{L - D}\right)$ from the relay optics, where f is the focal length of the relay optics, L is the optical length of the eye, D is the distance of the reflectors associated with the cornea (317, 617, 750) and fovea centralis (517, 619, 752).

7. Short-coherence interferometer for measuring partial distances of the eye according to one of the preceding claims, characterized in that the measurement beam focus (320, 710, 710') generated by the focusing optics (319, 709, 709') is moved back and forth periodically by a distance somewhat greater than $L - D$ (L = optical length of the eye; D = distance of the reflectors associated with the cornea and fovea centralis).

8. Short-coherence interferometer for measuring partial distances of the eye according to one of the preceding claims, characterized in that the splitting into the interferometer measurement arm and reference arm (701, 702) of the short-coherence interferometer is carried out by means of one or more fiber-optic couplers (700).

9. Short-coherence interferometer for measuring partial distances of the eye according to claim 1, characterized in that at least one deflecting element (316, 749) and elements of the focusing optics (319, 709, 709') are mounted next to one another in the movement direction or at an angle to the movement direction on separate scanning devices which are moved periodically back and forth.

10. Short-coherence interferometer for measuring partial distances of the eye according to claim 1, characterized in that at least one deflecting element (316, 749) and elements of the focusing optics (319, 709, 709') are mounted on separate scanning devices which are moved periodically back and forth, and the movements of the two scanning devices are electronically synchronized, or the movements can be modified in function relative to one another.

11. Short-coherence interferometer for measuring partial distances of the eye according to one of the preceding claims, characterized in that the scanning device (355 with 356, 725 with 726, and 925 and 925' with 926 and 926') is preferably a scanning table

controlled by a stepper motor or piezo-motor, a voice coil scanner, or an ultrasound piezo-scanning table.

12. Short-coherence interferometer for measuring partial distances of the eye according to one of the preceding claims, characterized in that a collecting lens, a dispersion lens (709') or an optical system comprising a plurality of fixed or variable elements is used as focusing optics (319, 709).

13. Short-coherence interferometer for measuring partial distances of the eye according to one of the preceding claims, characterized in that a so-called rapid scan optical delay line or other path length modulator is also used with the interferometer in the reference arm or measurement arm.

14. Short-coherence interferometer for measuring partial distances of the eye according to one of the preceding claims, characterized in that the initial coincidence of the measurement focus and coherence window is placed approximately in the center of the anterior chamber of the eye or at another desired location by additional means for adjusting an optical element in the beam path, e.g., by means of a mirror (306, 747).

15. Short-coherence interferometer for measuring partial distances of the eye according to one of the preceding claims, characterized in that the scan travel is reduced by optical folding of the reference beam path and/or measurement beam path.

16. Short-coherence interferometer for measuring partial distances of the eye according to one of the preceding claims, characterized in that a dispersion compensation is carried out automatically by traversing wedge plates which are arranged in the reference beam path parallel to the movement direction, and the compensating action therefore depends on the displacement position.

17. Short-coherence interferometer for measuring partial distances of the eye according to claim 1, characterized in that means are provided for adjusting or orienting the measurement beam axis relative to the optical axis or to the visual axis of the eye.

18. Short-coherence interferometer for measuring partial distances of the eye according to one of the preceding claims, characterized in that a construction based on the dual beam method is used.

19. Short-coherence interferometer for measuring partial distances of the eye

according to one of the preceding claims, characterized in that a right-angle mirror or right-angle prism is provided as deflecting element.